

## APPENDIX A

**FOSSIL FUEL-FIRED STEAM GENERATORS:** The following procedures shall be used to convert gaseous emission monitoring data in parts per million to g/million cal (lb/million BTU) where necessary.

(1) **Measurement of Oxygen in Flue Gas:** When the owner or operator of a fossil fuel-fired steam generator elects to measure oxygen in the flue gases, the measurements of the pollutant concentration and oxygen concentration shall each be on a consistent basis (wet or dry).

a. When measurements are on a wet basis, except where wet scrubbers are employed or where moisture is otherwise added to stack gases, the following conversion procedure shall be used:

$$E_Q = C_{ws} F_w \frac{(20.9)}{(20.9(1 - B_{wa}) - \% O_{2wa})}$$

b. When measurements are on a wet basis and the water vapor content of the stack gas is determined at least once every fifteen minutes the following conversion procedure shall be used:

$$E_Q = C_{ws} F \frac{(20.9)}{(20.9(1 - B_{ws}) - \% O_{2ws})}$$

Note: This equation is approved in principle. Approval for actual practice is contingent upon demonstrating the ability to accurately determine  $B_{ws}$  such that any absolute error in  $B_{ws}$  will not cause an error of more than +/- 1.5 percent in the term:

$$\frac{(20.9)}{(20.9(1 - B_{ws}) - \% O_{2ws})}$$

c. When measurements are on a dry basis, the following conversion procedure shall be used:

$$E_Q = CF \frac{(20.9)}{(20.9 - \% O_2)}$$

(2) **Measurement of Carbon Dioxide in Flue Gas:** When the owner or operator elects to measure carbon dioxide in the flue gases, the measurement of the pollutant concentration

and the carbon dioxide concentration shall each be on a consistent basis (wet or dry) and the following conversion procedure used:

$$E_Q = CF_c \frac{(100)}{(\%CO_2)}$$

The values used in the above equations are derived as follows:

$E_Q$  = Pollutant emission, g/million cal (lb/million BTU).

$C$  = Pollutant concentration, g/dscm (lb/dsdf), determined by multiplying the average concentration (ppm) for each hourly period by  $4.16 \times 10^{-5}$  M g/dscm per ppm ( $2.64 \times 10^{-9}$  M lb/dscf per ppm) where M = pollutant molecular weight, g/g mole (lb/lb mole) or M = 64 for sulfur dioxide and 46 for oxides of nitrogen.

$\%O_2, \%CO_2$  = Oxygen or carbon dioxide volume (expressed as percent) determined with equipment specified under Section 303 of Rule 245.

$F, F_c$  = A factor representing a ratio of the volume of dry flue gases generated to the calorific value of the fuel combusted (F), a factor representing a ratio of the volume of carbon dioxide generated to the calorific value of the fuel combusted ( $F_c$ ), respectively. Values of F and  $F_c$  are given in § 60.45 (f) of Part 60, Chapter 1, Title 40, Code of Federal Regulations.

$C_{ws}$  = Pollutant concentrations at stack conditions, g/wscm (lb/wscf), determined by multiplying the average concentration (ppm) for each one-hour period by  $4.15 \times 10^{-5}$  M g/wscm per ppm ( $2.59 \times 10^{-9}$  M = lb/wscf per ppm) where M = pollutant molecular weight, g/g mole (lb/lb mole) or M = 64 for sulfur dioxide and 46 for nitrogen oxides.

$\%O_{2ws}$  = Oxygen volume (expressed as percent - wet basis) determined with equipment specified under Section 303 of Rule 245.

$F_w$  = A factor representing a ratio of the volume of wet flue gases generated to the caloric value of the fuel combusted. Values of  $F_w$  are given in Federal Register, Vol. 41, October 12, 1976, p. 44838, a.4.

$B_{wa}$  = Proportion by volume of water vapor in the ambient air. Approval may be given for determination of  $B_{wa}$  by on-site instrumental measurement provided that the absolute accuracy of the measurement technique can be demonstrated to be within +/- 0.7 percent water vapor. Estimation

methods for  $B_{wa}$  are given in Federal Register, Vol. 41, October 12, 1976, p. 44838, a.5.

$B_{ws} =$  Proportion by volume of water vapor in the stack gas.

**SULFURIC ACID PLANTS:** For sulfuric acid plants, the owner or operator shall:

- (1) Establish a conversion factor three times daily according to the procedures of § 60.84 (b) of Chapter 1, Title 40, Code of Federal Regulations dated 10/6/75;
- (2) Multiply the conversion factor by the average sulfur dioxide concentration in the flue gases to obtain average sulfur dioxide emission in Kg/metric ton (lb/short ton); and
- (3) Report the average sulfur dioxide emission for each averaging period in excess of the applicable emission standard in the quarterly summary.

**NITRIC ACID PLANTS:** For nitric acid plants, the owner or operator shall:

- (1) Establish a conversion factor according to the procedures of §60.73(b) of Chapter 1, Title 40, Code of Federal Regulations;
- (2) Multiply the conversion factor by the average nitrogen oxides concentration in the flue gases to obtain the nitrogen oxides emissions in the units of the applicable standard;
- (3) Report the average nitrogen oxides emission for each averaging period in excess of applicable emission standard in the quarterly summary.

**ALTERNATE DATA REPORTING OR REDUCTION PROCEDURES:** The Control Officer may allow data reporting or reduction procedures varying from those set forth in Rule 245 if the owner or operator of a source shows to the satisfaction of the Control Officer that his procedures are equally effective. Such procedures may include, but are not limited to the following:

- (1) Alternative procedures for computing emission averages that do not require integration of data (e.g., some facilities may demonstrate that the variability of their emissions is sufficiently small to allow accurate reduction of data based upon computing averages from equally spaced data points over the averaging period).
- (2) Alternative methods of converting pollutant concentration measurements to the units of the emission standards.

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